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| 10/757,274 | 01/14/2004 | Patrick Y. Maeda | D/A1535 (1508/3640) | 4324 |
| 7590 | 11/01/2007 | | EXAMINER | |
| Gunnar G. Leinberg, Esq. Nixon Peabody LLP Clinton Square P.O. Box 31051 Rochester, NY 14603-1051 | | | PHAM, HAI CHI | |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | |
|------------------------------|-------------------------|------------------|
| Office Action Summary | Application No. | Applicant(s) |
| | 10/757,274 | MAEDA, PATRICK |
| | Examiner Hai C. Pham | Art Unit 2861 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on RCE & Amendment filed 10/01/07.
- 2a) This action is **FINAL**. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1,2,8,14-16 and 21-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-2, 8, 14-16, 21-27 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) All b) Some * c) None of:
1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. _____.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) Notice of Informal Patent Application
- 6) Other: _____

FINAL REJECTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10/01/07 has been entered.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-2, 8, 15, 21 and 25-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sun et al. (US 6,091,537) in view of Wilson (US 5,940,113).

With regard to claim 1, Sun et al. discloses a micro-optic light emitting array comprising a plurality of vertical cavity surface-emitting lasers (VCSELs), wherein each vertical cavity surface-emitting laser (65) emits a laser beam focused with a micro-optic element (microlens 12) (Figs. 2-3), and wherein the plurality of vertical cavity surface-emitting lasers are arranged in a two-dimensional configuration of rows and columns

that area staggered along the process direction (the vertical cavity surface-emitting laser 65 and the microlens 12 are arranged in a one-to-one configuration, and the whole assembly is staggered two-dimensionally) (col. 1, lines 44-56) (col. 5, lines 7-10).

With regard to claims 8, 15 and 21, Sun et al. discloses a xerographic printing system (Figs. 4-5) comprising a laser printbar assembly including a plurality of micro-optic emitting arrays including a plurality of vertical cavity surface-emitting lasers (65), wherein each vertical cavity surface-emitting laser (65) emits a laser beam focused with a micro-optic element (microlens 12) (Figs. 2-3), and wherein the plurality of vertical cavity surface-emitting lasers are arranged in a two-dimensional configuration of rows and columns that area staggered along the process direction, and (the vertical cavity surface-emitting laser 65 and the microlens 12 are arranged in a one-to-one configuration, and the whole assembly is staggered two-dimensionally) (col. 1, lines 44-56) (col. 5, lines 7-10), a photoreceptor (150, Fig. 4 or 260, Fig. 5), which receives said emitted light and holds a charge image (col. 4, lines 7-8 and 43-44), and xerographic developer for applying toner to the charged areas (the developer is inherent to any xerographic printing system).

However, Sun et al. does not explicitly disclose the two-dimensional configuration of the vertical cavity surface-emitting laser array having at least three rows and columns that are diagonally staggered in a parallelogram pattern, and wherein the acute angle between the column and the process direction (θ) of the parallelogram pattern is defined by the following formula: $\theta = \arctan(d/(r N_p))$, wherein d is the distance between

columns of emitters, r is the distance between rows of emitters, and N_p is the number of beams per column.

Wilson discloses a light bar print head comprising a high-resolution, two-dimensional VCSEL array having three rows and columns that are diagonally staggered in a parallelogram pattern to improve the VCSEL density as well as to improve the resolution of the printing system (Fig. 9) (col. 5, lines 45-62), the VCSEL array comprising three rows and three columns, the columns being extended in the process direction and being arranged such that the line connecting the VCSEL elements in the columns forms an acute angle θ with respect to the process direction and that:

$$\tan \theta = d / (r.N_p) \quad \text{OR} \quad \theta = \arctan (d/(r N_p))$$

given d is the distance between columns of the VCSEL elements, r is the distance between rows of the VCSEL elements, and N_p is the number of beams or VCSEL elements per column, i.e. $N_p = 3$.

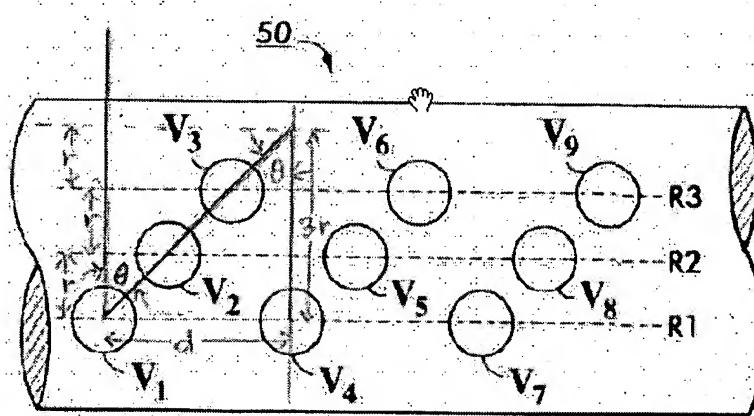


FIG. 9

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to arrange the micro-optic light emitting array of Sun et al. into a two-dimensional VCSEL array having three rows and columns that are diagonally staggered in a parallelogram pattern as taught by Wilson. The motivation for doing so would have been to improve the VCSEL density as well as to improve the resolution of the printing system as suggested by Wilson.

With regard to claim 2, Sun et al. discloses the diameter of the microlens to be 100 μm and the Full Width at Half Maximum of the emitted laser beam at the VCSEL to be 3.2 μm , but fails to teach the diameter of the microlens to be about 2.5 to 4.0 times larger than the Full Width at Half Maximum of the emitted laser beam at the microlens as claimed. It would have been obvious to one having ordinary skill in the art at the time the invention was made to set the diameter of the microlens with respect to the Full Width at Half Maximum of the emitted laser beam at the microlens at the claimed range, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

With regard to claims 25 and 26, Sun et al. teaches:

- the xerographic printing system having no overlap of the micro-optic focusing element (Figs. 4-5),
- the xerographic printing system comprising a raster output scanner or ROS (col. 1, lines 51-53).

4. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sun et al. in view of Wilson, as applied to claim 8 above, and further in view of Kwak (Pub. No. US 2004/0120376).

Sun et al., as modified by Wilson, discloses all the basic limitations of the claimed invention except for the lasers within a particular array being switched on at different times.

Kwak discloses a two-dimensional vertical cavity surface emitting laser array for use in a printing system or a laser scanner (paragraph [0005]), wherein the light emitting source assembly is configured so as each VCSEL has an independent electrode such that one VCSEL is driven independently from an adjacent VCSEL (paragraph [0013]).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to provide independent electrodes to the VCSEL assembly in the device of Sun et al. as taught by Kwak. The motivation for doing so would have been to allow the laser driver to easily address each light-emitting element.

5. Claims 1, 15-16 and 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fork et al. (US 6,121,983) in view of Wilson.

Fork et al. discloses xerographic printing system comprising a laser printbar imager assembly (VCSEL printbar 101) (Fig. 2) including a plurality of micro-optic light emitting arrays (115) including a plurality of vertical cavity surface emitting lasers arranged in a two-dimensional configuration, wherein each vertical cavity surface emitting laser emits a laser beam focused with a micro-optic element (210), a

photoreceptor (178, Fig. 1B), which receives said emitted light and holds a charge image, and xerographic developer (not shown), which applies toner to charged or uncharged areas of said photoreceptor produced by exposure to emitted light from the laser printbar imager assembly (col. 1, 14-22) (col. 5, lines 16-33).

Fork et al. fails to teach the plurality of vertical cavity surface emitting lasers being arranged in a two-dimensional configuration of at least three rows and columns that area diagonally staggered in a parallelogram pattern along the process direction, and wherein the acute angle between the column and the process direction (θ) of the parallelogram pattern is defined by the following formula: $\theta = \arctan(d/(r N_p))$, wherein d is the distance between columns of emitters, r is the distance between rows of emitters, and N_p is the number of beams per column.

Wilson discloses a light bar print head comprising a high-resolution, two-dimensional VCSEL array having three rows and columns that are diagonally staggered in a parallelogram pattern to improve the VCSEL density as well as to improve the resolution of the printing system (Fig. 9) (col. 5, lines 45-62), the VCSEL array comprising three rows and three columns, the columns being extended in the process direction and being arranged such that the line connecting the VCSEL elements in the columns forms an acute angle θ with respect to the process direction and that:

$$\tan \theta = d / (r.N_p) \quad \text{OR} \quad \theta = \arctan (d/(r N_p))$$

given d is the distance between columns of the VCSEL elements, r is the distance between rows of the VCSEL elements, and N_p is the number of beams or VCSEL elements per column, i.e. $N_p = 3$.

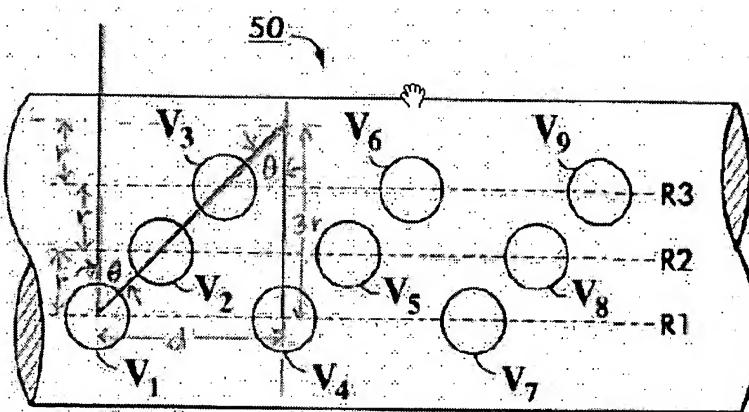


FIG. 9

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to arrange the micro-optic light emitting array of Sun et al. into a two-dimensional VCSEL array having three rows and columns that are diagonally staggered in a parallelogram pattern as taught by Wilson. The motivation for doing so would have been to improve the VCSEL density as well as to improve the resolution of the printing system as suggested by Wilson.

With regard to claim 16, Fork et al. further teaches the photoreceptor being placed where the beams of at least some of the plurality of vertical cavity surface emitting lasers overlap (col. 9, lines 55-60).

With regard to claims 22-24, although Fork et al. teaches the placement of the photoreceptor being set such that the spacing of the projected spots on the surface of the photoreceptor is regular to within 10% of the pixel size, Fork et al. does not disclose

the raster spacing, e.g., projected spots spacing, being either equal to 50% or greater than 50% but less than 90% intensity spot diameters or spot sizes. It would have been obvious to one having ordinary skill in the art at the time the invention was made to locate the photoreceptor such that the raster spacing being either equal to 50% or greater than 50% but less than 90% intensity spot diameters or spot sizes as claimed, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

6. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fork et al. in view of Wilson, as applied to claims 15-16 above, and further in view of Kwak.

Fork et al., as modified by Wilson, discloses all the basic limitations of the claimed invention except for the xerographic printing system being a laser multifunction system.

However, it is old and well known in the art the xerographic printing system can be used as a laser multifunction system as evidenced by Kwak, which discloses a vertical cavity surface emitting laser for use in a printing system or a laser scanner (paragraph [0005]).

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to provide independent electrode to the VCSEL assembly of Fork et al. as taught by Kwak. The motivation for doing so would have been to allow the laser driver to provide a versatile scanner/printer system.

Response to Arguments

7. Applicant's arguments filed 10/01/07 have been fully considered but they are not persuasive.

Applicant argued that "Wilson does not teach or suggest a parallelogram having a vertical angle determined through the formula recited in the claimed invention". The examiner respectfully disagrees. Wilson discloses in Fig. 9 a light bar print head comprising a two-dimensional VCSEL array having three rows and three columns that are diagonally staggered in a parallelogram pattern, the columns being extended in the process direction and being arranged such that the line connecting the VCSEL elements in the columns forms an acute angle θ with respect to the process direction and that:

$$\tan \theta = d / (r.N_p) \quad \text{OR} \quad \theta = \arctan (d/(r N_p))$$

given d is the distance between columns of the VCSEL elements, r is the distance between rows of the VCSEL elements, and N_p is the number of beams or VCSEL elements per column, i.e. $N_p = 3$ (See also the reproduced Fig. 9 of Wilson above with some explanatory annotations).

Conclusion

8. All claims are drawn to the same invention claimed in the application prior to the entry of the submission under 37 CFR 1.114 and could have been finally rejected on the grounds and art of record in the next Office action if they had been entered in the

application prior to entry under 37 CFR 1.114. Accordingly, **THIS ACTION IS MADE FINAL** even though it is a first action after the filing of a request for continued examination and the submission under 37 CFR 1.114. See MPEP § 706.07(b).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hai C. Pham whose telephone number is (571) 272-2260. The examiner can normally be reached on M-F 8:30AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Luu can be reached on (571) 272-7663. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Hai Pham

HAI PHAM
PRIMARY EXAMINER

October 28, 2007